

## **Portuguese scientific output on Web of Science and on Scopus: a comparative analysis**

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**Abstract:** In 2004 the Portuguese library consortium, Online Knowledge Library (b-on), was launched and with it, it became easier to get access to full text international scientific publications. This study aims to analyse some bibliometric indicators of the Portuguese scientific output seeking to evaluate the correlation with b-on. It was analysed the usage of b-on resources by the public universities members of the consortium from 2004 to 2010, with a sample of the five universities with more downloads per FTE (full time equivalent). In addition to the usage data, we analysed the Portuguese scientific output through the comparison of two databases: Web of Science (WoS) from Thomson Reuters and Scopus from Elsevier from which we identified the articles indexed with Portuguese affiliation and by the five Portuguese universities between 2000-2010. The study confirms that the availability and access to electronic resources contributes to the increased of the scientific productivity of the universities and that the study and analysis of its use and output are essential

**Keywords:** Online Knowledge Library, Electronic resources, Bibliometry, Scientific Production, Web of Science, Scopus, Portugal

### **1. Introduction**

With the advent of the electronic resources the cooperation between libraries was reinforced with their association in consortium to negotiate better contracts, provide access to contents in a larger scale (Big Deal), making the transition to digital information. This practice was especially developed between

academic libraries, since these Institutions are the ones with greater usage of the available electronic contents.

With this study we intend to present and analyse some bibliometric indicators of the Portuguese Scientific Production seeking to associate them with the emergence of the Portuguese consortia in 2004.

Currently b-on provides access to 17 content providers (Annual Reviews, Elsevier, Springer, Sage, Taylor & Francis, Wiley-Blackwell, Cambridge University Press, Emerald, Nature, American Chemical Society, Royal Society of Chemistry, American Institute of Physics, IEEE, Association for Computing Machinery, Society for Industrial and Applied Mathematics, Web of Knowledge, EBSCO). In 2010 b-on gave access to more than 19.000 journals, 18.000 e-books and 12.000 conference proceedings in full text, covering of the several scientific subject areas, figure 1 (Costa, 2010).

**Figure 1 – Annual evolution of b-on’s titles (2004-2010)**



## 2. Objectives

The objectives of this study are: determine the usage that universities teachers and researchers make of the online scientific information offered by b-on; identify and characterize the scientific output of universities linking it with the increased usage of b-on’s resources; measure the level of relevance and the use of online sources and identify the scientific subject areas with major output. In addition to the usage data of the consortium, we used the Web of Science (WoS) and Scopus from which we identified the articles indexed with Portuguese affiliation and by the five Portuguese universities between 2000-2010

## 3. Methods

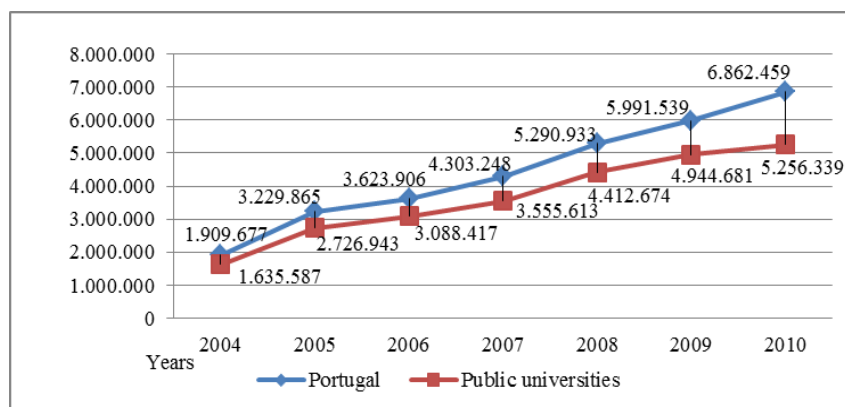
The evaluation and improvement of the research quality carried out at universities is one of the primary goals of the European Higher Education and that contributed to bibliometry earning additional emphasis in recent years. The sources of information used to obtain quantitative indicators are the bibliographic databases that collect information about the articles published in scientific journals. These databases have emerged due to the huge growth of

scientific publications, which led to the establishment of the management and structuring systems of information that allow to perform specific researches and to retrieve relevant information. From these bibliographic resources, bibliometry found a field of action. There are several databases with bibliometric indicators and evaluation of scientific literature, however, in this study we used WoS from Thomson Reuters and Scopus from Elsevier (Score, 2009).

They are both multidisciplinary databases and frequently updated. Without doubt both WOS and Scopus are useful for finding research information by end users and for doing useful analyses of the results.

In methodological terms a survey of the number of downloads per b-on institution was made (we just considered the journals downloads) The data has been taken from the statistical reports provided by b-on, whose data are obtained from the COUNTER reports (JR1) provided by each content supplier. In terms of the use of resources b-on has been growing year by year, reaching in 2010 almost 7 million of downloads, as it can be seen in Figure 2. These figures show the importance of the electronic scientific resources for the national academic and scientific community that year by year helps to increase its use. The creation and availability of b-on was one of the most important actions in favour of that community, providing flexibility and democratizing access to scientific knowledge.

**Figure 2 – Evolution of downloads (2004-2010)**



We have chosen as sample the five universities with more downloads per FTE (full time equivalent): University of Aveiro, University of Porto, University of Minho, New University of Lisbon and Technical University of Lisbon as you can see at Table1. These universities have distinctive sizes, the University of Porto is the largest Portuguese university, the university of Minho, Nova de Lisboa and Técnica de Lisboa have medium size and Aveiro is the smallest of the five institutions.

**Table 1- Universities FTE's**

Universities	2004-2006	2007 - 2009	2010
Aveiro	878	957	983
Minho	1.257	1.331	1.171
Nova de Lisboa	1.496	1.496	1.547
Porto	2.281	2.281	2.321
Técnica de Lisboa	1.851	1.851	1.861

However regarding the ratio of the number of downloads per FTE/year by University between 2004-2010 we find that the University of Aveiro is the one that presents a greater use, ie, the institution with the highest number of downloads per user / year. Situation observed since 2004 and maintained until 2010 with the exception of 2008, in which the ratio of the number of downloads per user / year was higher at the University of Porto (43,61) as we can see at Table 2.

**Table 2 - Universities with more downloads per FTE**

Universities	2004	2005	2006	2007	2008	2009	2010
Aveiro	24,9	30,7	33,6	29,1	38,3	45,8	45,3
Minho	7,0	14,1	17,0	21,7	26,9	28,1	30,6
Nova de Lisboa	8,1	14,4	15,8	17,6	22,6	28,2	29,3
Porto	11,6	18,9	23,9	25,2	43,6	38,2	43,4
Técnica de Lisboa	9,1	15,9	16,7	20,0	22,9	24,1	20,4

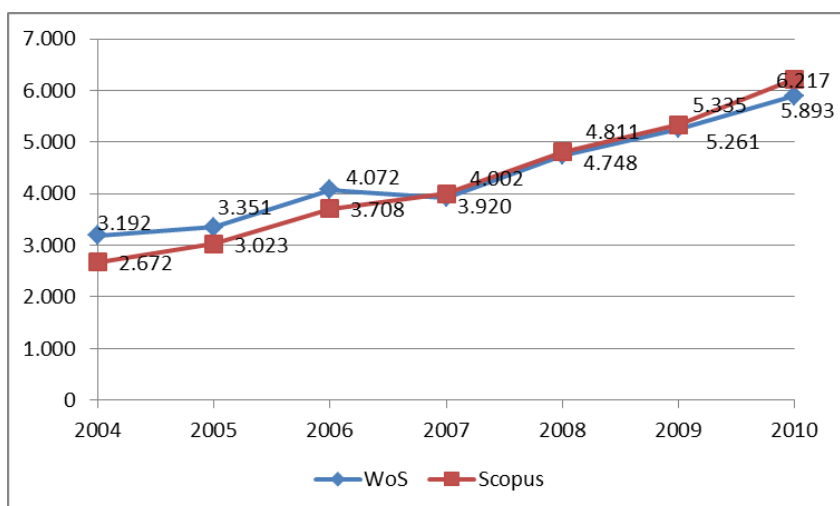
In order to collect the data from the academic production we used the expressions: Univ\* Aveiro/ Porto/Minho/ Nova de Lisboa/ Técnica de Lisboa.

In WoS we used the field "address", year to year selected and after obtaining the results we refined it by: "article". In Scopus we used the "affiliation name". Every year was selected and limited to "document type" "article". The results were refined in the left column under "affiliation". We only selected the entries "University of X" specifically.

#### **4. Results**

The number of articles with Portuguese affiliation has gradually increased in recent years, with a tendency for a greater increase in the number of articles indexed in Scopus as we can see in Figure 3.

Figure 3 – Evolution of the number of articles



Regarding the five studied institutions we found 30.437 articles indexed in WoS and 29.768 in Scopus published in the years under analysis. The affiliation of the authors indicates that from the five institutions analysed it is the University of Porto the one with more articles indexed either in WoS or in Scopus (Table 3).

Table 3 – Scientific production in Wos and Scopus - total

Year	Univ. Aveiro		Univ. Minho		Univ. Nova Lisboa		Univ. Porto		Univ. Tecnica Lisboa	
	Articles		Articles		Articles		Articles		Articles	
	WoS	Scopus	WoS	Scopus	WoS	Scopus	WoS	Scopus	WoS	Scopus
<b>2004</b>	609	483	400	313	433	251	854	809	896	816
<b>2005</b>	672	595	386	323	480	282	918	915	895	908
<b>2006</b>	829	710	507	435	584	352	1.081	1.204	1.071	1.007
<b>2007</b>	741	744	508	539	506	317	1.139	1.301	1.026	1.101
<b>2008</b>	918	921	596	587	619	379	1.379	1.545	1.236	1.379
<b>2009</b>	940	970	658	702	734	463	1.610	1.769	1.319	1.431
<b>2010</b>	1.022	1.044	781	860	846	632	1.815	2.059	1.429	1.622
<b>Totals</b>	5.731	5.467	3.836	3.759	4.202	2.676	8.796	9.602	7.872	8.264

The number of articles from the Universities of Aveiro and Minho are very similar in both databases, the University Nova de Lisboa presents superior

outcomes in WoS and the universities of Porto and Técnica de Lisboa have more articles indexed in Scopus.

We calculated the ratio of production per 100 researchers and confirm that the number of Portuguese articles has gradually increased over the years in both databases.

**Table 4 – Scientific production in Wos and Scopus – ratio per 100 researchers**

Universities	2004		2005		2006		2007		2008		2009		2010	
	Wos	Scopus	Wos	Scopus	Wos	Scopus	Wos	Scopus	Wos	Scopus	Wos	Scopus	Wos	Scopus
Aveiro	69,36	55,01	76,54	67,77	94,42	80,87	77,43	77,74	95,92	96,24	98,22	101,36	103,97	106,21
Minho	31,82	24,90	30,71	25,70	40,33	34,61	38,17	40,50	44,78	44,10	49,44	52,74	66,70	73,44
Nova Lisboa	28,94	16,78	32,09	18,85	39,04	23,53	33,82	21,19	41,38	25,33	49,06	30,95	54,69	40,85
Porto	37,44	35,47	40,25	40,11	47,39	52,78	49,93	57,04	60,46	67,73	70,58	77,55	78,20	88,71
Técnica Lisboa	48,41	44,08	48,35	49,05	57,86	54,40	55,43	59,48	66,77	74,50	71,26	77,31	76,79	87,16

## 5. Conclusions

This work analysis the use of the Portuguese b-on consortium resources by its institutional members. As anticipated we confirmed that the type of institution with more downloads are the universities. These institutions are also the ones with more articles indexed in the WoS and Scopus databases.

We believe that the availability of electronic resources contributes to the higher productivity of universities. Regarding this Tenopir & King (2008) say that there are differences between academics with high consumption of information and the remaining ones concerning the scientific output. The best-known researchers made an intensive use of journals. The general trend is therefore to an increase of publications of Portuguese authors / researchers in scientific journals.

## References

- Costa, M. T. (2010). A experiência portuguesa no acesso a conteúdos académicos e científicos eletrônicos: o caso da Biblioteca do Conhecimento Online (b-on). RBPG. Revista Brasileira de Pós-Graduação, 7(13).
- Score, S. C. (2009). Web of Science and Scopus: a comparative review of content and searching capabilities. The Charleston Advisor, 11(1).
- Tenopir, C., & King, D. W. (2008). Electronic Journals and Changes in Scholarly Article Seeking and Reading Patterns. D-Lib Magazine, 14(11/12). doi: 10.1045/november2008-tenopir